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BERKELEY CALIFORNIA

RESEARCH
NOTE

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A DEODAR CEDAR PLANTATION IN SOUTHERN CALIFORNIA

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Deodar cedar (Cedrus deodara (Roxb.) Loud.) is one of the fine timber trees of the high Himalaya where it reaches a height of 200 feet and a diameter of 11 feet. [1] Because of its rapid growth, lush foliage, and graceful form it has long been a favorite landscaping tree throughout California. Its possible value as a forest tree, however, appears to have been largely overlooked despite the high technical qualities of its wood. This paper describes what may be the only deodar cedar plantation in California that has developed under near-forest conditions. It is hoped that the data presented here will give forest managers some idea of the performance they might expect of this true cedar in California.

Location and History of the Plantation

The plantation is at Tanbark Flat, a field station of the San Dimas Experimental Forest, in the San Gabriel Mountains. It was established by the Los Angeles County Department of Forester and Fire Warden. According to Mr. G. P. Gruendyke, who assisted in the planting, the trees were put in as 1-1 potted stock in February, 1930. At the time the trees were inspected in the fall of 1960, they had spent 31 growing seasons in plantation. Planting was done in shallow basins, and the trees may have been watered somewhat during the first year or two. The seedlings were raised in a nursery from seed collected in the Pasadena area from old ornamentals. The original source of this seed is unknown.

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[1] Dallimore, W., and Jackson, A. Bruce. Handbook of Coniferae including Gingkoaceae. Edward Arnold and Co., London. 570 pp., illus. 1923.

There are now 56 living trees and one dead one, in seven rows. Gaps in the rows suggest there may have been 4 to 6 more trees originally, but this cannot be verified. Spacing between trees varies from 8 feet to 12 feet. Twenty-five of the trees are in exterior rows. The following remarks apply only to those in the interior of the stand unless otherwise noted.

Growth Habit and Size

In general the trees are fine-limbed and narrow-crowned. They have the drooping leader characteristic of the species. There has been virtually no self-pruning, and branch stubs persist down to ground level. There are six forked trees, but as all forking is within 2 feet of the ground, it is probably due to browsing damage during the early years. There is a striking equality between forked boles, neither appearing able to dominate the other.

Twenty of the trees were straight-boled, eight had well-defined crooks or sweep, and three had the peculiar kinks that often occur high in deodar cedar crowns. This kinkiness was especially pronounced in trees growing on the lower border, and may be the result of wind damage to the leaders of exposed trees.

Several trees had evidence of old cones in their crowns, and many were bearing heavy crops of pollen which shed profusely during the first week of November.

Diameters of all trees were measured, and heights were taken of several trees selected at random (table 1).

Table 1.--Diameters and heights of trees in interior of stand[1/][2/]

Crown class	No. of trees	D.b.h. in inches			No. of trees	Total height in feet		
		Smallest	Largest	Average		Shortest	Tallest	Average
Co-dominant	16	8.6	12.8	9.9	9	56	76	62
Intermediate	12	5.9	9.4	7.5	4	52	66	58
Suppressed	3	4.6	6.0	5.1	0	-	-	-

[1/] A tree in the lower border row measured 16.2 inches d.b.h. and 81 feet in height.

[2/] Basal area in a 1/10 acre plot was found to be 123 square feet per acre.

Some of the trees have incurred damage from falling trees in adjacent stands. All dead limbs were pruned in the winter of 1959-60 as a fire-control measure.

Two species of Phytophthora are known to attack healthy deodar cedars in the United States; crown canker (P. cactorum (Leb. and Cohn) Schroet.) and root crown canker (P. cinnamomi Rands), 2/ but no evidence of cankers was observed in the plantation.

Deodar's Natural Range

In its native Himalaya, deodar cedar occupies a broad area from Afghanistan southeast to Garhwal, at elevations of 4,000 to 10,000 feet. Precipitation varies from 20 to 74 inches within this belt. In India deodar cedar reaches its best development on highly podsolized soils in association with spruces, firs, and pines. Precipitation is largely in the form of snow. The rain is mostly from the southwest monsoon, and falls during the late summer. Mean monthly temperatures vary from a minimum of 35° F. to a maximum of 75° F. at Mukteshwar and Chakrata. 3/

Conditions at Tanbark Flat

The Tanbark Flat plantation is at an elevation of 2,700 feet. Precipitation averages 28 inches annually, of which nearly all is rain. About 97 percent of this falls from October to April. Annual rainfall during a 25-year period has varied from 11 to 48 inches. 4/ Because of the long summer droughts, evaporation from a free water surface exceeds 64 inches annually. 5/ Mean monthly temperatures range from a minimum of 46° F. to a maximum of 72° F. During a 25-year period the absolute minimum was 18° F. and the maximum 109°F. 6/

The plantation is on a low ridge situated just above a small canyon bottom, and faces to the south. Soil is a well-drained silty sandy loam probably derived from gneiss and somewhat over 3 feet deep (Personal communication from J. M. Crawford, Jr., November 18, 1960). Decomposition of deodar cedar litter has been slow. The raw humus layer is up to 6 inches deep and forms a spongy mat beneath the stand.

2/ Spaulding, Perley. Diseases of foreign forest trees growing in the United States. U. S. Dept. Agr. Handbook 139. 118 pp. 1958.

3/ Food and Agriculture Organization. Tree planting practices in temperate Asia. FAO Forestry Development Paper 14. Rome. 150 pp., illus. 1959.

4/ Reimann, Lyle F., and Hamilton, Everett L. Four hundred sixty storms. Data from the San Dimas Experimental Forest, U. S. Forest Serv. Pacific Southwest Forest and Range Expt. Sta. Misc. Paper 37, 101 pp., illus. 1959.

5/ Reimann, Lyle F. Mountain evaporation. Data from the San Dimas Experimental Forest. U. S. Forest Serv. Pacific Southwest Forest and Range Expt. Sta. Misc. Paper 35, 14 pp. 1959.

6/ Reimann, Lyle F. Mountain temperatures. Data from the San Dimas Experimental Forest. U. S. Forest Serv. Pacific Southwest Forest and Range Expt. Sta. Misc. Paper 36, 33 pp. 1959.

Conclusion

In view of its rapid growth under marginal forest conditions in the San Gabriel Mountains, deodar cedar appears worthy of trial under more favorable environments elsewhere in southern California as well as the west slope of the Sierra Nevada.